ought to experience the least difficulty in using the simple adjectives "higher" or "upper" and "lower" for the parts of the spectrum, and the simple prepositions "above" and "below," where required. There is no possibility of misconception, and no explanation is needed.

Probably we have got beyond the stage in which misconception is likely to arise from the careless use of words expressing continuity or otherwise in a spectrum; but I would suggest the word "diffuse" where it is not intended to express anything precise. Thus the coronal spectrum is diffuse until we know it to be solar. M. Janssen testifies to dark lines seen in the (diffuse) spectrum. J. HERSCHEL

Camp Nandair, Hyderabad, March 19

Turner's Vision

I HAVE been waiting since the appearance of a report of Dr. Liebreich's lecture in NATURE of March 21 expecting that an animated discussion would be provoked, affording me an opportunity of slipping in obscurely as a minor combatant, the subject being one on which I am but very indifferently qualified to speak, although thirteen years ago I did incidentally suggest an explanation of the peculiarities of Turner's later pictures which, simple as it is, still appears to me sufficient. On page 67 of "Through Norway with a Knapsack," published in 1859, speaking of some of the peculiar midnight sunset effects of the North, I said that "Turner, like an eagle, has dared to face the sun in his full glare, and to place him in the middle of his pictures, showing us how we see a landscape with sun-dazzled eyes, when everything is melted into a luminous chaos, and all the details blotted out with misty brightness."

In all these peculiar pictures that I have seen the sun is thus placed in the middle of the picture, and just sufficiently above the horizon (from about 10° to 20°, or at most 25°) to pour his rays about perpendicularly to the curvature of the eye-ball, when the face is in position to contemplate a landscape. I have frequently repeated the experiment of contemplating a landscape under such circumstances, and on every occasion of submitting to such torture have seen all the effects of even the most extravagant of Turner's later pictures, which are so well described by Dr. Liebreich. I have seen the "vertical streakiness, which is caused by every illuminated point having been changed into a vertical line," with an "elongation, generally speaking, in exact proportion to the brightness of the light," and that "there proceeds from the sun, in the centre of the picture, a vertical yellow streak." These appearances may arise from an affection of the crystalline lens of my eye similar to that attributed by Dr. Liebreich to Turner, or it may be due to something else much simpler, and which is more or less common to all human eyes. If the simpler explanation based upon normal conditions covers the facts, it certainly must be the more acceptable.

My explanation of the vertical streaks is this. When we thus look full faced at the sun, the dazzle produces slight inflammation or irritation, and a flow of tears. The liquid accumulates, and rests upon the lower eyelid, forming a little pool, the surface of which has a considerable vertical curvature, *i.e.* the lower part of the retained tear curves upwards from the surface of its base at the root of the lower eyelashes to its summit contact with the conjunctiva. Thus in a vertical direction it must act as a lens of very short focus, it must refract and converge the rays of light in a vertical plane, and thus produce a vertical magnifying effect, the definition of which will of course be very confused and obscure, on account of the irregular curvature, and the fact that the eye is focused to the distant objects. This want of directive focusing will limit the distortion to the bright objects whose vertically magnified images will be forced upon the attention.

To test this explanation let any one select a bright afternoon, and at about 6 P.M. or a little later, at this season, gaze sunward upon any landscape free from London smoke or other medium of solar obscuration. At first, if his eyes are not very sensitive, he will see a circular sun, but presently, as the tears accumulate, the vertical elongation of the sun and general "vertical streakiness" will appear. When I tried the experiment last week the sun appeared like a comet with a brilliant vertical conical tail, the point of which rested on the horizon. But I was then slightly troubled with what is called "a cold in the head," and my eyes watered very vigorously, and thus the conditions for producing fine Turneresque effects were highly favourable. On carefully drying my eyes these effects were, for a moment, considerably diminished.

I have adopted another method of testing this explanation. Having caused the eyes to become somewhat suffused, I bring the upper and lower eyelids so near together that the liquid shall occupy a sensible depth, *i.e.*, from the conjunctiva to the base of both upper and lower eyelashes, and by compression be bulged or curved outwards in the vertical direction. On looking through this tear-filled chink at a gaslight, the vertical elongation is remarkably displayed, and it extends upwards or downwards or both according to the position of the liquid. When looking at the sun and landscape with the eyes fully opened (which is very painful), the elongation is chiefly downwards, and obviously connected with the tear on the lower eyelid; but if the eyelids be nearly closed to diminish the intensity of the light, an upward elongation is also commonly visible.

The other phenomena represented by Turner are, I think, simply a faithful copying of the effects of glare and suffusion produced by painful sun-gazing and the looking at a landscape where the shadows are, so to speak, nowhere, or all behind one's back. W. MATTIEU WILLIAMS

The Adamites

As "M. A. I." prefers to keep his incognito, I shall not seek further to induce him to reveal himself. He has now, however, pointed out what he conceives to be errors in my paper, and I will reply to his criticism.

In the first place, as to the word *pi-ta*, I neither said nor inferred that the final syllable is not a suffix. My remark was that it retained a primitive root, *ta*, which is found also in the Semitic *'ata*, and I submit still that I am perfectly correct. The suffix *tár* in Sanskrit denotes nouns of agency, as Bopp shows in his "Comparative Grammar," and I am quite justified, when I find in various other languages a root word similar both in sound and sense, in inferring that the Sanskrit suffix was originally of the same character. I have hitherto been under the impression that comparative philology had established that suffixes were at one time independent words, but it appears that I am wrong. To show, however, that I have erred in good company, I would refer to Prof. Max Müller's "Stratification of Language" (p. 32), where it is said, "suffixes and affixes were all independent words, nominal, verbal, or pronominal; there is, in fact, nothing in language that is now empty, or dead, or formal, that was not originally full, and alive, and material." I must plead guilty of ignorance of "M. A. I.'s" scientific method.

As to *Taata*, when it is shown that *Tamata* or *Tangata* was the original form of the Polynesian deity's name, I shall be better able to reply to your correspondent's criticism. In any case, the final syllable is evidently the word denoting "spirit," and I see no difficulty in *Ta* becoming either *Tam* or *Tang* as the result of phonetic change. The mere fact that *Taata* and *Tiki* are different gods with different attributes really amounts to nothing, since such a division of personality and characteristics is a common fate of the divinities of heathen mythologies. I see no reason to change my opinion that the name of the Polynesian great ancestor has preserved the same primitive root as that which is to be found in the name of the first man, Adam, of the Semites, or rather of the *Akkad* forerunners.

While replying to "M. A. I.," it may be well to notice the criticism of his advocate, Mr. Jenkins, for whose explanation of the meaning of the word *Adam* I am much obliged, although, if he will take the trouble to read my paper, he will see that I was not ignorant of what he states. But the acceptance of the Hebrew meaning of the word as the original one does not lead me to place much reliance on Mr. Jenkins's judgment. If the Old Testament narrative proves anything beyond a knowledge of the tradition as to Adam, it is that the narrator was a bad philologist, and that finding the Hebrew word *adamah*, he forthwith inferred that the first man was made of ground-dust, which gave to him its red colour. For my part, I entirely ignore the authority on such a point of the Hebrew writer, and in justification I beg to refer to the statement made by the Rev. A. H. Sayce before the Society of Biblical Archæology, as reported in the last number of NATURE (p. 495), that the early Semitic traditions are derived from an Akkadian source, as are also most of the biliteral roots of the Semitic language. If the traditions are taken from that source, the probability is that the proper names they enshrine have had the same origin; and I submit, therefore, that I am quite justified in tracing the meaning of the word Adam to the old Chaldean tongue, in which, as Mr. Norris's Assyrian dictionary shows, and as my paper asserts, *Ad* signifies "a father."

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In conclusion, I may add that there is nothing improbable to my mind in peoples even so distant from each other as the Polynesian Islanders and the Gauls retaining in their traditions a name which had been applied to their mythical common ancestor, nor unreasonable in supposing that they and other peoples mentioned in my paper were alike derived from some region in Central Asia. My argument is simply cumulative, as there are many facts of a different kind pointing in the same direction.

I am sorry my communication has reached such an inordinate length; but having replied to "M. A. I.'s" objections, which, after his first letter, forcibly remind me of the mountain in labour bringing forth a mouse, I shall not trouble you with further correspondence on a subject which I fear is far from interesting to a majority of your readers. C. STANILAND WAKE

Meteor

As I was going along the road towards Greystoke Castle at half-past eight P.M. on Friday last, April 19, I noticed a very fine meteor in a south-east direction. It was about the size of a common hand-ball, its centre being of an exceedingly brilliant white colour, surrounded by a circle of a bluish tinge, while short flickering radiations were distinctly visible on its circumference in all directions, reminding me of the sphero-stellate spiculæ of certain sponges. It was falling in a perpendicular direction, but I was not fortunate enough to see it at the beginning of its course. Its downward motion was slow and quite gradual, apparently not swifter than an ordinary india-rubber ball would fall by the gravity of its own body. There was no trail whatever left behind in its course. After two or three seconds it suddenly disappeared, before reaching the ground, without any explosion or expansion of its body. The night was very close and still, a muddiness covering the whole sky, interspersed here and there with long stratus clouds, and a beautiful halo surrounding the moon. THOMAS FAWCETT

Blencowe School, Cumberland, April 22

A Waterspout

ON Saturday last, April 16, whilst fishing in the river Elwy, at a point about two miles above the well-known Cefn caves, and five from St. Asaph by the river, I witnessed a very singular phenomenon. My attention was suddenly called up-stream by a remarkably strange hissing, bubbling sound, such as might be produced by plunging a mass of heated metal into water. On turning I beheld what I may call a diminutive waterspout in the centre of the stream, some forty paces from where I was standing. Its base, as well as I could observe, was a little more than two feet in diameter. The water curled up from the river in an unbroken cylindrical form to a height of about fifteen inches, rotating rapidly, then diverged as from a number of jets, being thrown off with considerable force to an additional elevation of six or seven feet, the spray falling all round as from an elaborately arranged fountain, covering a large area. It remained apparently in the same position for about forty seconds, then moved slowly in the direction of the right bank of the river, and was again drawn towards the centre, where it remained stationary as before for a few seconds. Again it moved in the former direction, gradually diminishing and losing force as it neared the bank, and finally collapsed in the shallow water. Strange to say, its course was perpendicular to the bank and not with the current.

At the time of the occurrence the river was still high, from the recent heavy rain, though the depth of water at the spot where I first observed it was not more than four feet. The current, of course, was stronger than usual, but presented a comparatively smooth surface. The day was fine and sunny, with a slight breeze from the S.E. The event occurred about 12.15, and lasted seventy or eighty seconds, as well as I could judge. The atmosphere in the immediate vicinity seemed, from the way in which the spray was scattered, to be somewhat agitated; but my impression was that such agitation was the result of the phenomenon, rather than its cause. I had fished over the spot a few minutes previously, and examined it afterwards with great care, but saw nothing to account for the wonder.

St. Beuno's College, St. Asaph, April 9. J. GRAY

Cuckoo's Eggs

THE discussion raised by Prof. Newton on the coloration of cuckoos' eggs has been very interesting doubtless to many readers of NATURE; a mite of information from New Zealand, concerning one species of the Cuculidæ, may not be out of place.

The German theory that "the egg of the cuckoo is approximately coloured and marked like those of the birds in whose nest it is deposited, that it may be less easily recognised by the foster parents as a substituted one," does *not* hold good in respect to our *Chrysococcyx lucidus*, Gml., pipiwharaupa, the whistler or small cuckoo.

The dupe is the piripiri, or gray warbler, *Gerygone flaviventris*, Gray, its eggs are white, dotted with red spots; the egg of the whistler of much larger size, is of a greenish dun.

However, I think it should be stated that the nest of the dupe is somewhat of a pear-shaped structure, firmly and thickly built, with a small entrance near the middle, well sheltered with feathers. Here discrimination betwixt eggs may be difficult for the foster parent, if it possesses the faculty and uses it. In the Trans. N. Z. Institute (vol. ii. pp. 58 and 65) reasons have been advanced by the writer for the selection of the warbler's nest by our brightly plumed cuckoo; may "the dim obscure" of its interior supply another reason? THOMAS H. POTTS

Ohinitahi, Feb. 5

Sun-spots and the Vine Crop

As the connection of sun-spots with terrestrial phenomena is now largely occupying the attention of scientific men, the following facts may be of some interest. The years in which the wine crop in Germany was unusually good seem (in this century, at least) to have returned at regular intervals. The close coincidence of these years with the years of minimum sun-spots is shown by the following table:—

Minimum of Sun-spots.		Wine-years.	Minimum of Sun-spots.		Wine-years.
1784·8	...	1784	1833·8	...	1834
1798·5	...	(?)	1844·0	...	1846
1810·5	...	1811	1856·2	...	1857 1858
1823·2	...	1822	1867·2	...	1868

I may add that the gentleman who first remarked the regular recurrence of wine-years at intervals of about eleven years was not aware of the periodicity of the sun-spots, and could not therefore have been in any way prejudiced. The years given in the above table are the only ones known in Germany as good wine-years.

These facts agree with the results of Messrs. Piazzi Smyth and Stone, who found that the mean temperature on the surface of the earth was subjected to a period of eleven years.

ARTHUR SCHUSTER

Owens College, Manchester, April 23

Tide Gauge

IN NATURE of the 18th is a letter from Mr. Pearson respecting Tide Gauges. As very little appears to be known of such instruments, we beg to inform you that we have made them for many years, and have now two finished, one for the Indian Government, and the other for the Australian Government, and we shall be happy to show them to any one wishing to see them. We think they could be made self-acting at a much less cost if the *exact* time of high water is not required.

449, Strand, W.C., April 19 ELLIOTT BROTHERS

Colour of the Hydrogen Flame

IN a communication from my zealous science-master, which I find in your issue of Thursday the 11th, it is stated that pure hydrogen has *no* tinge of blue in its flame (that colour being due to the presence of sulphur), and he concludes his note with a gushing tribute of his own, and the younger boys' gratitude for the "simply delightful Science Primers of Profs. Huxley, Roscoe, and Balfour Stewart." Let me call his attention to the fact that on page 26 of his Chemistry Primer, Prof. Roscoe distinctly states that "Hydrogen is inflammable, and burns with a pale blue flame." A GRATEFUL PUPIL OF MR. BARRETT

The "Cheironectes pictus"

SINCE I communicated to you an account of a fish which I caught in the Gulf weed during the homeward voyage of H.M.S. *Charybdis*, I have seen, in the February number of the *American*

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